IN THE CLAIMS:

1   1.   Cancelled

1   2.   Cancelled

1   3.   (Currently Amended) The method of determining resistance, as defined in ~~claim~~

2   ~~2~~claim 17 including the further step of

3   evaluating any changes in said calculated resistance over time as a measure of

4   fuel cell hydration.

1   4.   (Currently Amended) A~~The~~ method of determining resistance in a fuel cell, ~~as~~

2   ~~defined in claim 1, including the further steps of~~comprising the steps of:

3   (A)   switching a fixed resistance load onto said fuel cell;

4   (B)   allowing a~~the~~ fuel cell stack voltage to stabilize at a first voltage level;

5   (C)   removing the fixed resistance;

6   (D)   substantially immediately measuring a~~the~~ new stack voltage; and

7   (E)   calculating the fuel cell resistance based upon the change between the first

8   voltage level and the new stack voltage.

5.   (Currently Amended) A ~~The~~ method of determining resistance in a fuel cell ~~as defined in claim 1 including the further~~ comprising the steps of:

(A)   providing a DC-DC converter with an associated microcontroller;

(B)   adjusting input parameters of said DC-DC converter, using said microcontroller, to establish an initial duty cycle;

(C)   reading a ~~the~~ stack voltage and the stack current;

(D)   changing the duty cycle;

(E)   substantially immediately measuring the fuel cell voltage and fuel cell current; and

(F)   calculating resistance based upon measurements.

6.   (Currently Amended) The method of determining resistance, as defined in ~~claim 1 including~~ claim 5 comprising the further step of

evaluating any changes in resistance over time as a measure of fuel cell hydration.

7.   (Currently Amended) The method of determining resistance, as defined in ~~claim 1~~ claim 5, wherein said fuel cell comprises one of the following:

(A)   a fuel cell stack;

(B)   a fuel cell array; and

(C)   an individual fuel cell.

8.   (Currently Amended) The method of determining resistance, as defined in ~~claim 3~~ claim 7, wherein a fuel cell in said fuel cell stack, said fuel cell array, or said individual fuel cell is a direct oxidation fuel cell.

9.   (Currently Amended) The method of determining resistance, as defined in ~~claim 4~~ claim 8, wherein said direct oxidation fuel cell is a direct methanol fuel cell.

10.   (Currently Amended) The method of determining resistance, as defined in ~~claim 3~~claim 7 , wherein a fuel cell in said fuel cell stack, said fuel cell array, or said individual fuel cell is a hydrogen fuel cell.

11. – 14. Cancelled

15.   (Original) A method of measuring resistance in a fuel cell stack being used as a power source, comprising the steps of:

(A)   using a fuel cell stack to produce power that can be supplied to a battery or load;

(B)   switching a fixed load across said fuel cell stack;

(C)   reading the voltage across the stack after a predetermined time period when said fixed load circuit is on;

(D)   turning off the load;

(E)   substantially immediately reading the stack voltage; and

(F)   determining stack resistance based upon a change in said stack voltage readings.

16.   (Original) A method of measuring resistance across a direct oxidation fuel cell stack that includes programmable DC-DC switches including the steps of:

(A)   using said programmable DC-DC switches to switch a load on and off said fuel cell stack;

(B)   signaling an associated microprocessor under pulse-width modulation con-trol to adjust the duty cycle of said DC-DC switches

(C)   measuring voltage changes as said switches change;

(D)   calculating a change in resistance over time; and

9   (E)   predicting cell hydration based upon said changes.

1   17.   (New) A method of determining resistance in a fuel cell, including the steps of:

2   (A)   measuring an initial stack current and stack voltage;

3   (B)   coupling constant current with the fuel cell to set stack current using a
4   constant current sink having an operational amplifier configured to receive a con-
5   trol voltage as an input and coupled at an output to a power transistor, and having
6   a second input couple between said power transistor and a sense resistor;

7   (C)   waiting a predetermined time period for the output voltage of the fuel cell
8   to stabilize;

9   (D)   measuring the output voltage of the fuel cell;

10   (E)   changing the fuel cell current using said constant current sink;

11   (F)   substantially immediately reading the output voltage of the fuel cell; and

12   (G)   calculating the resistance of the fuel cell.